

PATENT SPECIFICATION

660,432



Date of Application and filing Complete Specification: June 27, 1949.

No. 16989/49.

Complete Specification Published: Nov. 7, 1951.

Index at acceptance:—Class 99(1), G24(d1 : e1), G25.

COMPLETE SPECIFICATION

Improvements in and relating to Hose End Fittings

I, ALBERT RICHARD JAMES RAMSEY, a British Subject, of Bridge House, 181, Queen Victoria Street, London, E.C.4, England, do hereby declare the nature of this invention (a communication to me from AEROPUMP CORPORATION, a Corporation organized under the laws of the State of Michigan, of 300, South East Avenue, Jackson, Michigan, United States of America), and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to end fittings for flexible metal reinforced hose and of the kind comprising an outer screw-connected socket and inner nipple adapted to define an annular elongated chamber between them in which the end portion of the hose is adapted to be clampingly received and securely held upon the end fitting in a fluid tight manner while permitting the operation of connection and disconnection of the hose end upon the fitting to be readily performed merely with the use of customary hand wrenches or pipe tightening tommy bars or like tools. More particularly the invention relates to end fittings of the above type which are adapted for high pressure and reinforced hose, that is rubber or rubber-like hose reinforced with metal braid or the like.

Although a great many types of fittings have been devised for the purpose of making a tight joint with tubing and with reinforced and other hose or rubber-like material comprising various types of conduits for liquids and gases, difficulty has been experienced in providing fittings which are sufficiently versatile that they can be employed with equal advantage in connection with the commercial run of products of all manufacturers. It is quite commonly appreciated, for example, that relatively wide tolerances are permitted in both the inside diameter and the outside diameter of commercial reinforced rubber hose. Because of the character of the rubber, or rubber-like material and the reinforcing material of which the hose is

made, it is not economically possible to hold the product to close tolerances. Furthermore, reinforced flexible hose made by one manufacturer is apt to experience a variation in size from a similar hose manufactured by another manufacturer, i.e., hose of rubber, or rubber-like material reinforced internally or exteriorly with metal braid or the like. Where the hose is internally reinforced it is intended that the end fitting should be adapted to receive an end portion of the hose bared-down to the reinforcement. Present day trends, however, are to employ high pressure hose having an outer metallic braid, or like covering. Where such form of hose is employed the present end fitting would be adapted to receive the hose end without any previous baring-down operation.

As a matter of practice, in order to accommodate their devices to all makes of commercial hose of a given size, fitting and coupling manufacturers have been forced, in some instances, to manufacture several fittings of different dimensions for a specified size to fit hose presumably of the same size but produced by different manufacturing concerns. This has been necessary to make certain of having available a fitting capable of making a tight joint with undersized or oversized hose or tubing. The unrealised aim of manufacturers has been to devise a fitting which can be stocked in standard sizes only and which is capable of successful use with both undersized and oversized hose.

It is among the objects of the present invention to provide a new and improved end fitting of the kind referred to which can be successfully used to make a tight joint with reinforced hose and tubing which may vary considerably from a nominally standard outside and inside diameter.

According to the invention in an end fitting of the kind referred to the inner and outer elongated surfaces of the socket and nipple respectively, and which define said elongated annular chamber, are tapered and inclined with respect to one another and to

[Price 2/-]

Price 4s 6d

the axis of the combined socket and nipple, so as to define, in a direction extending away from the open end of the elongated annular chamber an acute angle of approximately 4° .

5 The invention also provides an end fitting for flexible reinforced hose according to the preceding paragraph and having further features of construction and arrangement as hereinafter described and claimed.

10 In the accompanying drawings:—

Fig. 1 is a longitudinal sectional view of a made-up fitting and hose in accordance with the invention.

Fig. 2 is an enlarged half longitudinal section of the end fitting itself, showing the particular formation of the hose receiving chamber and the acute angle feature thereof, and

Fig. 3 is a partly sectioned elevational view of the end portion of a hose prepared for assembly in the end fitting cavity.

The fitting herein described is what is commonly known as a detachable fitting, sometimes designated for specific purposes as a coupling. Detachable and re-usable fittings and couplings are so constructed that they can be applied to a length of hose in the field by the use of ordinary tools, rather than being the type of fitting necessitating the use of bench tools or dies specially constructed for making up the joint. Detachable fittings are widely used because of the fact that they can be assembled in the field wherever it is necessary to connect a hose. When installations of this kind are made, it is first necessary to cut off a hose end to the proper length, then apply the fitting parts to the hose and tighten them to seal the joint, after which the fitting is ready for attachment to a machine, pump, engine, valve or even to another length of similar hose.

In the specific embodiment chosen to illustrate the invention an internally reinforced hose 1 is shown attached to an end fitting comprising an outer socket 2 and an inner nipple 3, the socket having a closed base end with a screw-threaded bore 4, in which the screw-threaded exterior 5 of the nipple 3 is received to define, with the socket interior, an elongated annular chamber 6 for the reception and firm securing of the hose end 7, the latter being shown stripped down to the reinforcement 8 by removal of the outer rubber or like layer of the hose.

The outer wall of the said chamber 6 is defined by interior wall portions of the socket which comprise a substantially cylindrical portion 9 at the closed end followed by a screw-threaded portion 10 and an outwardly tapered portion 11 which terminates in a substantially cylindrical portion 12 which defines the open socket end.

The inner wall of the chamber 6 is defined by exterior wall portions of the nipple which

comprise a continuation 13 of the screw-threads 5 followed by a tapered portion 14 and an end cylindrical portion 15 at the open end of the cavity, which latter, however, need not be present as the tapered surface can be continued in its stead. These surfaces 70 combine to form the elongated annular chamber 6 into a shape which is suited to the reception of the hose end 7 in a secure and fluid-tight manner.

The screw-threads 5 and 10 are of opposite hand, whereby when the nipple is screwed home into the socket the hose end tends to be drawn into the resulting chamber 6 and will cause the end edge 16 of the outer hose layer to be brought into close fluid-tight engagement with the tapered socket end portion 11.

An important feature of the end fitting resides not only in the screw-threaded form of the socket portion 10 but also in the formation of the screw-threading of progressively decreasing diameters from one end of the socket and in the acute angle relationship between the resulting tapered screw-threaded interior and the tapered nipple 90 portion 14. This angle is indicated by α in Fig. 2 and should be of the order of 4° for the best results. It will also be observed that the surface 11 presents, with the end thread 10a, another acute angle with the surface of the end portion of the nipple, which angle is indicated by β in Fig. 2.

In practice the threads 10 will be left-hand, as compared with the right-hand threads 5 and 13.

To give the desired taper formation to the tip surfaces of the threads 10 it is convenient either to machine the interior socket surface to taper to remove the thread tips, or to swage the socket from the outside so as to cause the thread tips to be disposed at the desired taper, with the progressive decreasing diameter characteristic above mentioned.

The threaded nipple portion 5 and 13 is longer than the threaded socket bore 4, whereby the important advantage results that in the assembling of the hose end upon the end fitting, and with the socket first threaded about the hose end by its left-hand threads, the nipple 3 can be started into screw-threaded engagement with the socket end 4 at the time the reduced nipple end 15 is just engaged in the hose end. Thereafter, continued rotation of the nipple relatively to the socket causes the hose end to be firmly contained in the chamber 6 to fill the latter and this with the full use of the mechanical advantage of the screw-threaded action, and the obtaining of a complete sealing engagement of the hose edge 16 against the tapered socket end portion 11.

In the screwing of the nipple into position, as the tapered portion 14 thereof progresses

inwardly within the stripped hose end it will tend to press the latter, with the braided metal reinforcing 8, outwardly so that the latter engages the threads 10. Where the pressure is sufficiently great to produce some flow of the material comprising the inner hose lining, excess material will be received partly within the enlargement 20 at the closed end of the chamber 6 and partly within the recess 17 formed at the junction of the tapered nipple portion 14 with the nipple portion 15. In assembled position the latter will be located substantially opposite the end socket portion 12.

15 The nipple and socket are designed with such relationship to each other that for hose of average inside and outside diameter the fitting will be made up tight when, as above stated, the threaded portion 5 and 13 of the nipple is only partially threaded into the socket base end 4. By making this provision some take-up is provided so that the fitting may be tightened still further in case the joint becomes leaky.

25 Regardless of how much the joint may be taken up, flow induced in the rubber layers of the hose is accommodated, at the outer end, by the space 17 between the outwardly tapered socket portion 11 and the nipple end portion 15, and at the inner end by the enlarged space 20. Good practice has taught that the angle of the tapered nipple portion 14 should be about 7° with respect to the longitudinal axis of the fitting, as compared with a 3° angle defined by the tips of the threads 10. This relationship, it will be appreciated, may be departed from to some extent while still providing a fitting capable of making a tight leak-proof joint under relatively high pressures in all circumstances.

An end fitting as thus provided may be quickly and efficiently machined by ordinary screw machine operation and may be interchangeable. Parts may be standardized so that a fitting for a specific designated size will fit tubing and hose varying widely in nominal inside and outside diameters, thus reducing the required inventory of sizes to satisfy a wide variety of circumstances. The coupling can be quickly made up in the field, taken apart, re-made and then tightened whenever it may be necessary by the use of ordinary mechanic's tools. Hard-walled as well as soft-walled hose and tubing may be connected with equal effectiveness, disconnected and re-connected again by adapting the dimensions of the interior fitting parts to the particular character and thickness of the hose or tubing wall.

60 The acute angle formed between the tapered nipple portion and a line drawn through the tips of the threads on the socket

interior is important and of a critical nature for the obtaining of the best results in that the angle should be approximately 4° if the optimum sealing-tight grip is to be maintained on the bared hose end portion.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent structures.

HAVING NOW particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:— 80

1. An end fitting of the kind specified wherein the inner and outer elongated surfaces of the socket and nipple, respectively, and which define said elongated annular chamber, are tapered and inclined with respect to one another and to the axis of the combined socket and nipple, so as to define, in a direction extending away from the open end of the elongated annular chamber, an acute angle of approximately 4°. 90

2. An end fitting as claimed in claim 1 wherein the socket is outwardly flared on its interior surface adjacent the open end thereof from the corresponding end of said tapered inner socket surface, said outwardly flared surface defining an acute angle with the said elongated nipple surface and forming a sealing surface for hose inserted in said annular chamber.

3. An end fitting as claimed in claim 1 or 2 wherein the said inner elongated socket surface is of toothed formation. 100

4. An end fitting as claimed in claim 1, 2 or 3 wherein the said inner elongated socket surface is constituted by screw-threading with the tips thereof of progressively decreasing diameter in the direction of the open socket end. 105

5. An end fitting as claimed in claim 4 wherein the said screw-threading is of opposite direction to screw-threading connecting the socket and nipple in assembled relationship to define said elongated annular chamber.

6. A socket and nipple end fitting constructed and arranged substantially as described herein with reference to the accompanying drawings. 115

Dated this 27th day of June, 1949.

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This Drawing is a reproduction of the Original on a reduced scale

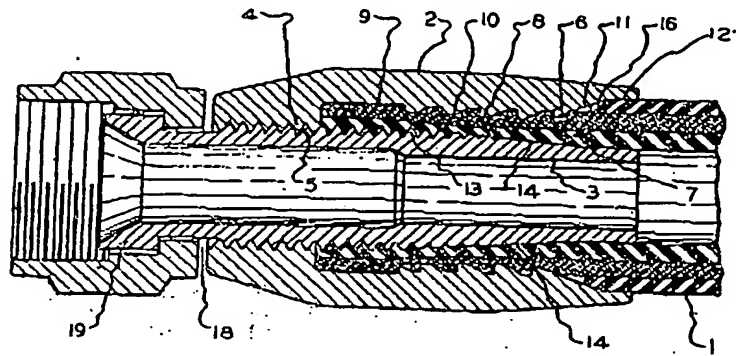


FIG. I.

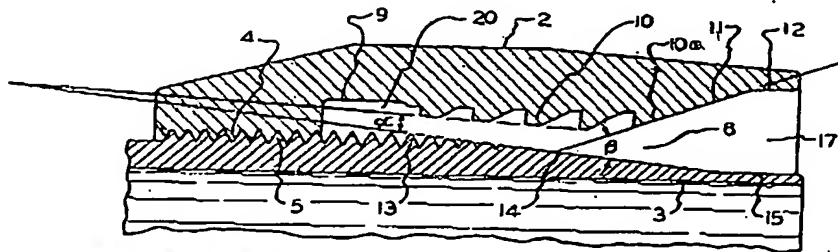


FIG. II.

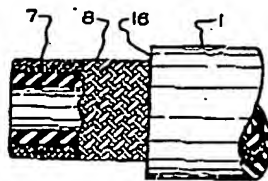


FIG. III.